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| 09/800,638      | 03/07/2001  | C. Brian Atkins      | 10004248-1          | 3332             |

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07/02/2004

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| EXAMINER |
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ROSARIO-VASQUEZ, DENNIS

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
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2621

DATE MAILED: 07/02/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/800,638

Applicant(s)

ATKINS ET AL.

Examiner

Dennis Rosario-Vasquez

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Amen A 04/15/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Amendment***

1. The amendment was received on April 15, 2004 and has been entered and made of record. Claims 1-20 are pending.

***Specification***

2. Due to the amendment, the objection to the paragraph on page 13, line 18 to page 14, line 2 has been withdrawn.

3. Due to the amendment, the objection to "horizontal" on page 20, line 26 has been withdrawn.

***Response to Arguments***

4. Applicant's arguments with respect to claims 1,8,15 and 18 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-17,19,20 are rejected under 35 U.S.C. 102(b) as being anticipated by Vehvilainen (US Patent 6,504,873 B1).

Regarding claim 1, Vehvilainen discloses an image processing system comprising:

a) a filter selection mechanism for receiving an input pixel window and responsive thereto for generating a filter identifier based on one of an edge parameter that was computed based on the input pixel window.

The filter selection mechanism is shown by Vehvilainen as a decoder unit 92 of fig. 7 which is implemented in the flowchart of figure 6 at step 74 that receives an image frame or window of fig. 5A that contains blocks and responsive thereto for generating a filter identifier (True or not true results of "equation (2)" is the filter identifier that are generated at step 74 as mentioned in col. 9, lines 51-67 and col. 11, lines 46-55 and col. 12, lines 3-6.) computed in step 74 based on one of an edge parameter ( $\text{activity}_{\text{edge}}$  mentioned in col. 9, lines 51-63 and col. 11, lines 43-63) that was computed based on the input pixel window of adjacent blocks (The edge parameter ( $\text{activity}_{\text{edge}}$ ) was computed from adjacent blocks as mentioned in col. 9, lines 62,63). ;and

b) a filter application unit coupled to the filter selection mechanism for receiving the filter identifier and applying a filter identified by the filter identifier to the input pixel window to generate an output pixel.

The filter application unit is shown in figure 7, num. 93 which is a filter as mentioned in col. 11, line 15 where the filter application unit 93 is coupled to the filter selection mechanism 92 via an arrow from 92 to 93, and the filter application unit 93 receives the results of the filter identifier equation (2) computed in the filter selection mechanism 92 using a program as shown in figure 6.

Regarding claim 2, Vehvilainen discloses the image processing system of claim 1 further comprising:

an edge parameter evaluation unit for computing at least one edge parameter based on the input pixel window.

The edge parameter evaluation unit is the CPU 96 of figure 7 that computes at least one edge parameter (activity<sub>edge</sub> mentioned in col. 9, lines 51-63 and col. 11, lines 43-63) using a program at step 74 of fig. 6 as mentioned from col. 11, line 56 to col. 12, line 10.

Regarding claims 3,12 and 19, Vehvilainen discloses the image processing system of claims 2 ,8 and 15 wherein the edge parameter (activity<sub>edge</sub>) is one of any measurable pixel unit related to an edge as mentioned in col. 11, lines 59-61.

Claims 4 and 5 have no patentable weight because of the "one of" limitation of claim 1.

Regarding claim 6, Vehvilainen discloses the image processing system of claim 1 wherein the filter application unit includes a filter repository for providing a plurality of filters for use by the filter application unit (The filter application unit of figure 7, num. 93 implements three kinds of filters as shown by the program steps of 80,82 and 84.).

Regarding claim 7, Vehvilainen discloses the image processing system of claim 6 wherein the filter repository includes a smoothing filter as shown during step 80 of figure 6.

Claim 8 has been addressed in claims 1 and 15.

Regarding claim 9, Vehvilainen discloses the method of claim 8 wherein the step of receiving includes the step of:

receiving an input pixel window (fig. 5A) that includes a current input pixel (Any pixel from the group labeled 53 of the input pixel window of figure 5A is the current input pixel.) and pixels adjacent to the current input pixel (Another group of pixels 51 are adjacent to the pixel group 53 where any one pixel can be the current input pixel).

Regarding claim 10, Vehvilainen discloses the method of claim 8 wherein the step of receiving includes the step of:

receiving an input pixel window (Fig. 5B is an input pixel window.) that includes a  $N \times N$  square of pixels (A  $3 \times 3$  section is shown for "Block N" which is a part of the input pixel window 5B.) centered about the current input pixel (A group of pixels 56 on the Block N side is centered about the  $3 \times 3$  section of Block N.).

Claim 11 is similar to claim 2 except the step of utilizing the edge parameter to generate the filter identifier. Vehvilainen uses the edge parameter ( $\text{activity}_{\text{edge}}$ ) to generate a true or not true filter identifier using equation (2) as mentioned in col. 11, lines 43-55.

Claim 13 has been addressed in claim 11.

Regarding claim 14, Vehvilainen discloses the method of claim 13 wherein the step of computing includes the step of computing a level of variation of a luminance plane mentioned in col. 5, lines 15-17. Note that color can be used as mentioned in col. 5, lines 8-17.

Regarding claim 15, Vehvilainen discloses a method for processing a digital image having a plurality of input pixels comprising:

a) receiving the digital image as shown in figure 7, num. 91 is a receiver as mentioned in col. 11, lines 14-20 that receives a video signal of blocks as shown in figure 2B. ;

b) for each input pixel 53 of figure 5A that is adjacent to the vertical line between block "N" and "N+1".

b1) generating a level of activity based on a first window of pixels with reference to the input pixel (The pixels- 53 within the first window "Block N" of figure 5A that corresponds with the pixels of figures 4 and 3A-3F depending on a measure of level of activity<sub>IN</sub> ( col. 11, lines 23-55.) that is used with reference pixel 53 of figure 5A.

b2) determining whether the level of variation (or activity<sub>IN</sub>) is in a predetermined relationship with a predetermined level of variation. Note that level of variation is the level of activity as mentioned in the specification. Using figure 6, the step of 66 is a determining step that determines whether the level of activity<sub>IN</sub> is in a predetermined relationship as shown by equation (2) in col. 9, line 55 with a predetermined level of variation of THRESHOLD<sub>IN</sub>.

b3) when the level of variation (or activity<sub>IN</sub>) is in a predetermined relationship (Equation (2)) with a predetermined level of variation THRESHOLD<sub>IN</sub>, applying a first filter (Using figure 6, if the predetermined relationship of equation (2) calculated in the step 66 is "TRUE", then a filter 80 is used (col. 11, lines 46-50).; and

b4) when the level of variation is not in a predetermined relationship with a predetermined level of variation (When the predetermined relationship or equation (2) is not true based on the level of variation ( $activity_{IN}$ ) (col. 11, lines 54,55), generating a measure of an edge parameter based on a second window of pixels with reference to the input pixel (An edge parameter ( $activity_{edge}$ ) is restored based on a second window 57 of figure 5C with reference to the input pixel (Pixel 53 of fig. 5A corresponds with pixel 34' of figure 3D as the input pixel.) of figure 3D, numeral 34' as mentioned in col. 11, lines 59-63 and col. 7, lines 36-39.), selecting an enhancement filter based on the measure of edge angle (Using the flowchart of figure 6 and figure 4, an enhancement filter step 84 is selected using a filter determining step 74 based on the  $activity_{edge}$  measure of edge angle as shown by the "REFERENCE LINE/LINEAR EQUATIONN (LE)" of fig. 4 which is perpendicular or 90 degrees to the "BLOCK BOUNDARY" line as mentioned in col. 3, lines 12-19.), and applying the selected enhancement filter to a third window to generate an output pixel corresponding to the current input pixel (The selected filter of step 84 of fig. 6 is applied to a third window 58 to output a pixel corresponding to pixel 53 of figure 5A which is also present in figure 5C relabeled as 57 and 58.).

Regarding claim 16, Vehvilainen discloses the method of claim 15 wherein the second window of figure 5, num. 57 that includes a neighborhood of 6 pixels that includes the current input pixel that is adjacent to the vertical line between Block N and Block N+1.



Regarding claim 17, Vehvilainen discloses the method of claim 15 wherein the first filter is a low pass filter as shown in the step 80 of figure 6 that replaces the current input pixel with a blurred version of the current input pixel as shown in fig. 3E where Block 1 and 2 have no definite border that divides block 1 and 2 as shown in fig. 3A as mentioned in col. 7, line 60 to col. 8, line 10.

Regarding claim 20, Vehvilainen discloses the method of claim 15 wherein the first window (fig. 5A, num. 53), the second window (fig. 5C, num. 57), and the third window (fig. 5C, num. 58) are the same decreasing window size of pixels.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vehvilainen (US Patent 6,504,873 B1) in view of Ghaderi (US Patent 5,481,628 A).

Claim 18 is similar to claim 15 except for the additional element of using the mean absolute deviation (MAD) for each respective step of claim 18. However, Vehvilainen does use a MQUANT probability measure with activity measures  $activity_{edge}$ , and  $activity_{in}$  that is implemented in the steps of claim 15 and computed using equation (2) in col. 9, line 55.

However, Ghaderi does teach the additional elements of claim 18 of the method of claim 15:

wherein the step of generating a level of activity based on a first window of pixels with reference to the input pixel includes

determining a mean absolute deviation (MAD) for image planes based on a first window of pixels (A mean absolute deviation  $M_d$  is calculated for the first window 28 of figure 2 as mentioned from col. 2, lines 64-65 and shown as a first window or large window outputted from 66 to 78 and 80 as mentioned in col. 5, lines 57-60.); wherein the first window includes the input pixel (The first window 28 of figure 2 has an input pixel 26.);

wherein the step of determining whether the level of variation is in a predetermined relationship with a predetermined level of variation includes

comparing the MAD,  $M_d$  with a predetermined threshold 'activity threshold value' as mentioned in col. 3, lines 17-20;

wherein the step of when the level of variation is in a predetermined relationship with a predetermined level of variation, applying a first filter includes

when the MAD,  $M_d$  is less than the predetermined threshold, 'activity threshold value', applying a low pass filter, low-pass function to the input pixel,  $P_i$  or pixel 26 of figure 2 to generate a smoothed output pixel as mentioned from col. 3, line 66 to col. 4, line 6.;

wherein the step of when the level of variation is not in a predetermined relationship with a predetermined level of variation, generating a measure of edge angle based on a second window of pixels with reference to the input pixel, selecting an enhancement filter based on the measure of edge angle, and applying the selected enhancement filter to a third window to generate an output pixel corresponding to the current input pixel includes

when the MAD,  $M_d$  is not less than the predetermined threshold as mentioned in col. 3, line 49-51, selectively applying to a 3 X 3 third window 30 of figure 2 of pixels one set of filter coefficients or weights selected from a group of sets of enhancement filter coefficients or weights (The weights can be applied to the 3 X 3 window uniformly or not to compute a local average,  $M_b$  (col. 2, lines 49-53) using the method of a global or large average,  $M_b$  as mentioned col. 2, lines 38-50) based on at least one edge parameter or character information ( The averaging method identifies character regions as mentioned in col. 2, lines 44-50. Thus characters have edges.) computed from the second window 28 of fig. 2 of pixels that is outputted from 66 of figure 5 to 68 and 70 to generate an output pixel,  $P_o$  of equation (3) at col. 3, line 55.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the MQUANT teaching of edge probability of Vehvilainen with Ghaderi's teaching of MAD, because Ghaderi's MAD is used to calculate an activity or variation for each window that provides a "greatly enhance[d]...readability of the processed image (Ghaderi, col. 1, lines 60-67)."

**Conclusion**

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kalevo et al. (US Patent 6,724,944 B1) is pertinent as teaching a method of using filter parameters 36 to select a filter 38 as shown in figure 4.

Gouge et al. (US Patent 5,224,175 A) is pertinent as teaching a method of using a mean absolute deviation with edge characteristics as shown in figure 1.

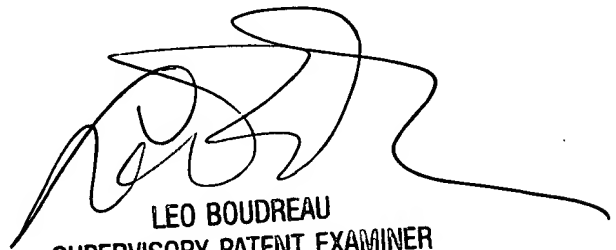
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario-Vasquez whose telephone number is 703-305-5431. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on 703-305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DRV

Dennis Rosario-Vasquez

  
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